51. Apparatus for analyzing fluid supplied to it through a tube, comprising:

(a) an analyzing instrument;

(b) a first connector attached to said tube and having an end face;

(c) a second connector attached to said analyzing instrument;

(d) a light source and a light receptor disposed such that when said first connector is correctly mated with said second connector, there is a clear optical path between at least one common point on said end face and each of said light source and said light receptor.

52. Apparatus for analyzing fluid according to claim 51, and wherein at least part of said end face is optically reflective.

53. Apparatus for analyzing fluid according to claim 51, and wherein at least part of said end face comprises a material selected from the group consisting of optically fluorescent and phosphorescent materials.

54. Apparatus for analyzing fluid according to claim 51, and wherein said light source comprises an end of an optical fiber having a source of light coupled to its other end.

55. Apparatus for analyzing fluid according to claim 51, and wherein said light receptor comprises an end of an optical fiber having an optical detector element coupled to its other end.

56. Apparatus for analyzing fluid according to claim 51, and wherein said light receptor comprises a detector element.

57. Apparatus for analyzing fluid according to claim 52 and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

58. Apparatus for analyzing fluid according to claim 52, and wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit

being configured so that only if a predetermined portion of light emitted from said light source is reflected by said at least part of said end face into said light receptor, does said circuit output said enabling signal to said analyzing instrument.

59. Apparatus for analyzing fluid according to claim 51, wherein said light source emits light in an essentially narrow band of wavelengths, and further comprising an optical filter, essentially transmissive to said band of wavelengths and disposed in said clear optical path.

60. Apparatus for analyzing fluid according to claim 53 and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

61. Apparatus for analyzing fluid according to claim 53, and wherein said light source emits light in a first band of wavelengths, such that stimulate said material to emit light in a second band of wavelengths, and further comprising an optical filter, essentially transmissive to at least one wavelength of said second band of wavelengths, and disposed in said clear optical path.

A2 cont.

62. Apparatus for analyzing fluid according to claim 61, and wherein said material is one of a plurality of types, characterized in that said second band of wavelengths has a spectral profile essentially different among said plurality of types, and wherein said optical filter is essentially transmissive to one or more wavelengths at which said one of said plurality of types emits strongly and substantially attenuative to wavelengths at which any other of said types emits strongly.

63. Apparatus for analyzing fluid according to claim 53, and wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if a predetermined portion of light emitted from said material is collected by said light receptor, does said circuit output said enabling signal to said analyzing instrument.

64. Apparatus for analyzing fluid according to claim 63, wherein said light source emits

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light as a first train of pulses and said circuit further includes a synchronous detector that is fed with a multiplying signal formed as a second train of pulses, the two trains of pulses having equal rates and said second train being delayed with respect to said first train.

65. Apparatus for analyzing fluid according to claim 51, and wherein said light source emits light in pulses.

66. A system for verifying the proper connection of a tube assembly to a fluid analyzing instrument, the connection being effected by means of a first connector which is part of the tube assembly, and which has an end face, and a second connector, mating with the first connector and attached to said analyzing instrument, the system comprising a light source and a light receptor disposed such that when said first connector is correctly mated with said second connector, there is a clear optical path between at least one common point on said end face and each of said light source and said light receptor.

67. The system of claim 66 and wherein at least part of said end face is optically reflective.

A2 cont.

68. The system of claim 66 and wherein at least part of said end face comprises a material selected from the group consisting of optically fluorescent and phosphorescent materials.

69. The system of claim 66 and wherein said light source comprises an end of an optical fiber having a source of light coupled to its other end.

70. The system of claim 66 and wherein said light receptor comprises an end of an optical fiber having an optical detector element coupled to its other end.

71. The system of claim 66 and wherein said light receptor comprises a detector element.

72. The system of claim 66 and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

73. The system of claim 67, and wherein said analyzing instrument is rendered operative

only upon reception of an enabling signal, and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if a predetermined portion of any light emitted from said light source is reflected by said at least part of said end face into said light receptor, does said circuit output said enabling signal to said analyzing instrument.

74. The system of claim 66, wherein said light source emits light in an essentially narrow band of wavelengths, and further comprising an optical filter, essentially transmissive to said band of wavelengths and disposed in said clear optical path.

75. The system of claim 68, and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

76. The system of claim 75, wherein said light source emits light in a first band of wavelengths, such that stimulate said material to emit light in a second band of wavelengths, and further comprising an optical filter, essentially transmissive to at least one wavelength of said second band and disposed in said clear optical path.

A2 cont.

77. The system of claim 76, wherein said material is one of a plurality of types, characterized in that said second band of wavelengths has a spectral profile essentially different among said plurality of types, and wherein said optical filter is essentially transmissive to one or more wavelengths at which said one of said plurality of types emits strongly and substantially attenuative to wavelengths at which any other of said types emits strongest.

78. The system of claim 68, wherein said analyzing instrument is rendered operative only upon reception of an enabling signal and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if a predetermined portion of any light emitted from said material is collected by said light receptor does said circuit output said enabling signal to said analyzing instrument.

79. The system of claim 78, wherein said light source emits light as a first train of pulses

and said circuit further includes a synchronous detector that is fed with a multiplying signal formed as a second train of pulses, the two trains of pulses having equal rates and said second train being delayed with respect to said first train.

80. The system of claim 66, wherein said light source emits light in pulses.

81. A system for verifying the class of a tube assembly connected to a fluid analyzer, the connection being effected by means of a first connector which is part of the tube assembly and which has an end face, and a second connector, mating with the first connector and attached to said analyzing instrument, the system comprising a light source and a light receptor disposed such that when said tube assembly is of the correct class, and when said first connector is correctly mated with said second connector, optical identifying information may be transferred along a clear optical path between at least one common point on said end face and each of said light source and said light receptor.

82. The system of claim 81 and wherein at least part of said end face is optically reflective.

a2 cont.

83. The system of claim 81 and wherein at least part of said end face comprises a material selected from the group consisting of optically fluorescent and phosphorescent materials.

84. The system of claim 81 and wherein said light source comprises an end of an optical fiber having a source of light coupled to its other end.

85. The system of claim 81 and wherein said light receptor comprises an end of an optical fiber having an optical detector element coupled to its other end.

86. The system of claim 81 and wherein said light receptor comprises a detector element.

87. The system of claim 81, and wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if correct optical identifying information from said light source is reflected by said at least part of said end face into said light receptor, does said circuit output said enabling signal to said

analyzing instrument.

88. The system of claim 81, wherein said light source emits light in an essentially narrow band of wavelengths, and further comprising an optical filter, essentially transmissive to said band of wavelengths and disposed in said clear optical path.

89. The system of claim 83 wherein said light source emits light in a first band of wavelengths, such that stimulate said material to emit light in a second band of wavelengths, and further comprising an optical filter, essentially transmissive to at least one wavelength of said second band and disposed in said clear optical path.

90. The system of claim 89, wherein said material is one of a plurality of types, characterized in that said second band of wavelengths has a spectral profile essentially different among said plurality of types, and wherein said optical filter is essentially transmissive to one or more wavelengths at which said one of said plurality of types emits strongly and substantially attenuative to wavelengths at which any other of said types emits strongest.

A2 Cont.

91. The system of claim 83, wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if correct optical identifying information is transferred from said light source to said light receptor, does said circuit output said enabling signal to said analyzing instrument.

92. The system of claim 91, wherein said light source emits light as a first train of pulses and said circuit further includes a synchronous detector that is fed with a multiplying signal formed as a second train of pulses, the two trains of pulses having equal rates and said second train being delayed with respect to said first train.

93. The system of claim 81, wherein said light source emits light in pulses.

94. A method for verifying the proper connection of a tube to a fluid analyzing instrument, the connection being effected by means of a first connector attached to the tube and having an

end face, and a second connector mating with said first connector and attached to said analyzing instrument, the method comprising the step of providing a light source and a light receptor disposed such that when said first connector is correctly mated with said second connector, there is a clear optical path between at least one common point on said end face and each of said light source and said light receptor.

95. The method of claim 94, and further comprising the step of making at least part of said end face optically reflective.

96. The method of claim 94, and further comprising the step of making at least part of said end face of a material selected from the group consisting of optically fluorescent and phosphorescent materials.

97. The method of claim 94 and wherein said light source comprises an end of an optical fiber having a source of light coupled to its other end.

A2 cont.

98. The method of claim 94 and wherein said light receptor comprises an end of an optical fiber having an optical detector element coupled to its other end.

99. The method of claim 94 and wherein said light receptor comprises detector element.

100. The method of claim 94 and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

101. The method of claim 95, wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising the step of providing an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if a predetermined portion of light emitted from said light source is reflected by said at least part of said end face into said light receptor, does said circuit output said enabling signal to said analyzing instrument.

102. The method of claim 94, wherein said light source emits light in an essentially narrow

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band of wavelengths, and further comprising the step of providing an optical filter, essentially transmissive to said band of wavelengths and disposed in said clear optical path.

103. The method of claim 96 and wherein said at least part of said end face is such that it includes said at least one common point, when said first connector is properly mated with said second connector in any angular orientation.

104. The method of claim 96, whereby said light source is made to emit light in a first band of wavelengths, such that stimulate said material to emit light in a second band of wavelengths, and further comprising the step of providing an optical filter, essentially transmissive to at least one wavelength of said second band and disposed in said clear optical path.

105. The method of claim 104, whereby said material is chosen to be one of a plurality of types, characterized in that said second band of wavelengths has a spectral profile essentially different among said plurality of types, and whereby said optical filter is made to be essentially transmissive to one or more wavelengths at which said one of said plurality of types emits strongly and substantially attenuative to wavelengths at which any other of said types emits strongest.

A 2 cont.

106. The method of claim 96, wherein said analyzing instrument is rendered operative only upon reception of an enabling signal, and further comprising the step of providing an electric circuit responsive to light impinging on said light receptor, said circuit being configured so that only if a predetermined portion of any light emitted from said material is collected by light receptor does said circuit output said enabling signal to said analyzing instrument.

107. The method of claim 106, whereby said light source is made to emit light as a first train of pulses, said circuit is made to include a synchronous detector and said synchronous detector is fed with a multiplying signal formed as a second train of pulses, the two trains of pulses having equal rates and said second train being delayed with respect to said first train.

108. The method of claim 94, whereby said light source is made to emit light in pulses.

109. A method for verifying the class of a connection tube connected to a fluid analyzer, the connection being effected by means of a first connector which is part of said tube assembly and which has an end face, and a second connector mating with said first connector and attached to said analyzing instrument, the method comprising the step of providing a light source and a light receptor disposed such that when said tube assembly is of the correct class, optical identifying information may be transferred along a clear optical path between at least one common point on said end face and each of said light source and said light receptor.

110. The method of claim 109, and further comprising the step of making at least part of said end face optically reflective.

111. The method of claim 109, and further comprising the step of making at least part of said end face of a material selected from the group consisting of optically fluorescent and phosphorescent materials.

112. A tube assembly for connection to a fluid analyzing instrument, comprising a connector having an end face, and wherein at least part of said end face is optically reflective.

A 2 Cont.

113. A tube assembly for connection to a fluid analyzing instrument, comprising a connector having an end face, wherein at least part of said end face comprises a material selected from the group consisting of optically fluorescent and phosphorescent materials.

114. The tube assembly of claim 112, wherein said at least part of said end face is formed with a reflective foil attached thereto.

115. The tube assembly of claim 112, wherein said at least part of said end face is formed with a reflective material deposited thereon.

116. The tube assembly of claim 112, wherein said at least part of said end face is formed with a reflective object bonded to said end face.

117. The tube assembly of claim 112, wherein said at least part of said end face has spectrally selective reflectivity.

118. The tube assembly of claim 112, and further comprising an optical filter having spectrally selective transmission and disposed over said at least part of said end face.

119. The tube assembly of claim 113, wherein said material is any one of a plurality of types, characterized by different spectra of emission.

120. The tube assembly of claim 113, wherein said material is deposited on said end face.

121. The tube assembly of claim 113, wherein said material is on an object attached to said end face.

122. The tube assembly of claim 113, wherein said material is imbedded in said end face.

123. The apparatus of claim 51, wherein said at least part of said end face has spectrally selective reflectivity.

A 2 Cont.

124. The apparatus of claim 123, wherein said light source emits light in a narrow band of wavelengths.

125. The apparatus of claim 123, and further comprising an optical filter having a spectrally selective transmission and disposed in said clear optical path between said common point and said light receptor.

126. The system of claim 67, wherein said at least part of said end face has spectrally selective reflectivity.

127. The system of claim 126, wherein said light source emits light in a narrow band of wavelengths.

128. The system of claim 126, further comprising an optical filter having a spectrally selective transmission and disposed in said clear optical path between said common point and said light receptor.

129. The system of claim 81, wherein said at least part of said end face has spectrally selective reflectivity.

130. The system of claim 129, wherein said light source emits light in a narrow band of wavelengths.

131. The system of claim 129, further comprising an optical filter having a spectrally selective transmission and disposed in said clear optical path between said common point and said light receptor.

132. The method of claim 95, and whereby said at least part of said end face is made to have spectrally selective reflectivity.

133. The method of claim 132, whereby said light source is made to emit light in a narrow band of wavelengths.

a2 Cont.

134. The method of claim 132, and further comprising the step of providing an optical filter having a spectrally selective transmission and disposing it in said clear optical path between said common point and said light receptor.

135. The method of claim 110, and whereby said at least part of said end face is made to have spectrally selective reflectivity.

136. The method of claim 135, whereby said light source is made to emit light in a narrow band of wavelengths.

137. The method of claim 135, and further comprising the step of providing an optical filter having a spectrally selective transmission and disposing it in said clear optical path between said common point and said light receptor.

REMARKS

Applicants have carefully studied the outstanding Office Action. The present